

Druckexemplar

CLAIMS

1. A microporous material which comprises a positively charged framework comprising a silicophosphate structure.
- 5 2. A microporous material as claimed in claim 1 having a framework density in the range of 12.5 to 20.5.
- 10 3. The use of a microporous material which comprises a positively charged framework comprising a silicophosphate structure as an anion exchange material.
4. The use as claimed in claim 3 which comprises the treatment of waste materials in effluent streams.
- 15 5. The use as claimed in claim 4 which comprises the removal of undesirable anion species from solutions in the nuclear power industry.
6. The use as claimed in claim 5 wherein the anion species comprises pertechnetate anions.
- 20 7. A silicophosphate for use as an anion exchange material.
8. An anion exchange material which comprises a silicophosphate.
- 25 9. A method for the synthesis of a microporous material which comprises a positively charged framework, wherein said microporous material comprises a silicophosphate, said method comprising:
- 30 (a) providing a two-phase system comprising:
- (i) an organic phase comprising an organosilicon compound;

26. AUG. 2004 17:58

HARRISON GODDARD FOO

NO. 286

P. 4

- ART 34 ANDT
- (ii) an aqueous phase comprising a phosphoric acid;
 - (iii) a phase transfer agent;
 - (iv) a structure directing agent; and
 - (v) a buffering agent;

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- (b) stirring and facilitating reaction between the reactants; and
- (c) isolating the product.

10. A method as claimed in claim 9 wherein said organic phase comprises an alcoholic phase.

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11. A method as claimed in claim 10 wherein said alcoholic phase comprises t-butanol or isoamyl alcohol.

12. A method as claimed in any one of claims 9, 10 or 11 wherein said organosilicon compound contains a labile group capable of reaction with phosphoric acid.

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13. A method as claimed in claim 12 wherein said organosilicon compound comprises a tetramethylsilyl halide.

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14. A method as claimed in claim 13 wherein said tetramethylsilyl halide comprises tetramethylsilyl chloride or tetramethylsilyl bromide.

15. A method as claimed in any one of claims 9 to 14 wherein said phosphoric acid comprises metaphosphoric acid or polyphosphoric acid.

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16. A method as claimed in any one of claims 9 to 15 wherein said phase transfer agent comprises an organic sulphonate salt.

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17. A method as claimed in claim 16 wherein said organic sulphonate salt comprises a toluene-4-sulphonate salt.

26. AUG. 2004 17:58

HARRISON GODDARD FOO

NO. 286

P. 5

18. A method as claimed in claim 17 wherein said toluene-4-sulphonate salt comprises sodium toluene-4-sulphonate,
19. A method as claimed in any one of claims 9 to 18 wherein said structure directing agent comprises cations.
20. A method as claimed in claim 19 wherein said cations comprise tetraalkyl ammonium cations.
21. A method as claimed in claim 19 or 20 wherein said structure directing agent comprises tetraethyl ammonium chloride or tetraethyl ammonium bromide.
22. A method as claimed in any one of claims 9 to 21 wherein said buffering agent comprises an ammonium salt.
23. A method as claimed in claim 22 wherein said ammonium salt comprises ammonium acetate.
24. A method as claimed in any one of claims 9 to 23 which proceeds at a temperature of between 0° and 100°C.
25. A method as claimed in claim 24 which proceeds at a temperature of between 20° and 70°C.
26. A method as claimed in claim 25 which proceeds at a temperature of between 40° and 60°C.
27. A method as claimed in any one of claims 9 to 26 which proceeds for a duration of between 30 minutes and 12 hours.

APT 34 ANDT

28. A method as claimed in claim 27 which proceeds for a duration of between 2 and 10 hours.

29. A method as claimed in claim 28 which proceeds for a duration of between 6 and 8 hours.

30. A method as claimed in any one of claims 9 to 29 wherein the microporous material is isolated from the reaction mixture by filtration.

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